REMARKS

Favorable reconsideration of the application is respectfully requested in light of the amendments and remarks herein.

Upon entry of this amendment, claims 1-17 will be pending. By this amendment, claims 1-17 have been amended. No new matter has been added.

Objections to the Specification

In Sections 1-3 of the Office Action, the Specification is objected to for informalities. Relevant parts of the Specification have been amended to address the objection.

Objections to the Drawings

In Section 4 of the Office Action, Figure 8 stands objected to for failing to designate the figure as prior art. Figure 8 has been amended to obviate the objection.

Objections to Claims 1, 5, 12, 14, and 16

In Section 5 of the Office Action, claims 1, 5, 12, 14, and 16 stand objected to for informalities. Claims 1, 5, 12, 14, and 16 have been amended to address the objection.

§103 Rejection of Claims 1, 2, 5-7, 9, 12-14, 16, and 17

In Section 7 of the Office Action, claims 1, 2, 5-7, 9, 12-14, 16, and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Farmine *et al.* (U.S. Patent 6,763,225; hereinafter referred to as "Farmine") in view of Weerackody *et al.* (U.S. Patent 6,807,145; hereinafter referred to as "Weerackody").

In the Background section of the Specification, it was disclosed that "the technique of EP 0 881 782 A2 claiming the calculation of the phase of a signal of each antenna cannot be applied to the multicarrier case, but only to a single carrier case, as it is impossible to measure phases of received signals if there are more than two carriers. ... In single carrier applications the phase of the signal changes frequently as the symbols are transmitted serially. Therefore it is difficult to compare phases between different antennas, as the phase is not varying uniformly. Therefore in singles carrier applications a phase comparison is preferably done using pilot symbols which phases are varying uniformly or which are known. ... The channel parameter estimation is performed using a two pass process that advantageously expands the temporal scope and considers past, present and future temporal channel estimations during parameter estimation. Channel parameters are estimated by processing the signals through fast Fourier transforms, temporal filters and inverse fast Fourier transforms. The temporal filters optimize parameters estimation based upon instantaneous correlation of the received signals. This all takes place on the receiver's side of the OFDM system." *Background of the Specification, page 1, line 26 to page 2, line 7.*

To address the above-described problem of the conventional diversity transmission, embodiments of the present invention provide device, method, and computer program for diversity transmission. For example, the structure of the transmission diversity device of claim 1, as presented herein, includes:

"*a plurality of antenna elements*;

a plurality of processing devices respectively connected to one of the antenna elements; and

phase comparison and adjustment means for comparing phases of signals received at the antenna elements and for adjusting the phases of signals

transmitted by the antenna elements according to the result of the comparison,

wherein the transmission diversity device is designed for a multicarrier transmission and individually compares the phases of at least one frequency subcarrier of the multicarrier transmission of each antenna element with the phase of at least one frequency subcarrier of at least one other antenna element and adjusts it subsequently for a transmission."

(emphasis added)

Thus, the transmission diversity device of claim 1 is designed for a multicarrier transmission and individually compares the phases of at least one frequency subcarrier of the multicarrier transmission of each antenna element with the phase of at least one frequency subcarrier of at least one other antenna element and adjusts it subsequently for a transmission. See *Specification, page 5, lines 4 to page 6, line 5*. Thus, the transmission diversity device, in one implementation as described in claim 1, is configured to receive different frequency subcarriers at each of the antenna elements. The device individually compares frequency subcarriers of the different antenna elements. By contrast, Farmine performs a comparison of a somewhat average total output of each antenna rather than an individual comparison of subcarriers. However, the transmission diversity device (described in claim 1) of the present invention carries out the averaging over the subcarriers (step 12) after an individual phase comparison of each subcarrier in step 10 in order to produce a matrix showing the relative phase of each subcarrier with respect to a base antenna. See *Figure 5*.

Thus, the "TX diversity technique is used to avoid the problem of fading for example due to multipath effects. According to the present invention, as it will be explained with reference to FIG. 5, a phase and/or amplitude adjustment is calculated in transmitter side such that no orthogonal signalling is required. The number of antenna means 2, 3 can be increased as much

as possible on the transmitter side to get a sharper beam (beam shaping)". See *Specification, page 5, lines 19-24.*

Farmine fails to teach or suggest actually measuring and calculating the phase differences at difference antenna elements. As stated in column 4, line 67 to column 5, line 7, Farmine discloses an empirical approach in which a phase adjuster 10 merely sweeps the phase difference of the antenna (2, 3) outputs and at the same time tracks the value of the product of the channel estimates until a maximum is detected. Then, the phase adjuster circuit 10 curtails the sweeping process and the phase difference is set at the point where the maximum computer product value is attained. Thus, Farmine uses the total "outputs" of the antennas 2,3.

Although Weerackody discloses a diversity system for an OFDM system, Weerackody fails to disclose targeting at a phase adjustment based on a previous measurement on the reception side. Further, Weerackody is not targeting at a compensation of phase delays. Weerackody merely proposes to apply phase offsets through a rotator 112a-112i in order to apply time varying offsets to the frequency components of the OFDM signal. According to column 5, lines 45-53 of Weerackody, by applying time varying offsets to the frequency components, the correlation of the data from the multiple transmitter is efficiently reduced, thus offering improvements over the prior art in terms of frequency diversity. However, the phase values of Weerackody are independent from any phase delays on the reception side. For example according to claims 4 and 5 of Weerackody, the phase offsets have well defined specific values because the offsets are only intended to improve the frequency diversity, not to compensate for any phase delays due to multiple effects. The limitation of the phase offset to the values in claim 4 of Weerackody (minus 10 degrees, zero degrees, plus 10 degrees) would fail to compensate for any measures of phase delay values outside of these singular values.

Based on the foregoing discussion, Farmine and Weerackody, individually or in combination, fail to teach or suggest all the limitations of claim 1. Therefore, claim 1 should be allowable over Farmine and Weerackody. Since claim 7 closely parallels, and recites substantially similar limitations as recited in, claim 1, claim 7 should also be allowable over Farmine and Weerackody. Further, since claims 2, 5, 6, 9, 12-14, 16, and 17 depend from one of claims 1 and 7, claims 1, 2, 5-7, 9, 12-14, 16, and 17 should also be allowable over Farmine and Weerackody.

Accordingly, it is submitted that the rejection of claims 1, 2, 5-7, 9, 12-14, 16, and 17 based upon 35 U.S.C. §103(a) has been overcome by the present remarks and withdrawal thereof is respectfully requested.

§103 Rejection of Claims 3 and 10

In Section 8 of the Office Action, claims 3 and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Farmine in view of Sakoda *et al.* (U.S. Patent 6,070,056; hereinafter referred to as "Sakoda").

Based on the foregoing discussion regarding claims 1 and 7, and since claims 3 and 10 depend from claims 1 and 7, respectively, claims 3 and 10 should be allowable over Farmine. Further, since Sakoda was merely cited for disclosing an amplitude-phase correction circuit for OFDM wave, Farmine and Sakoda, individually or in combination, fail to teach or suggest all the limitations of claims 3 and 10.

Accordingly, it is submitted that the rejection of claims 3 and 10 based upon 35 U.S.C. §103(a) has been overcome by the present remarks and withdrawal thereof is respectfully requested.

§103 Rejection of Claims 4, 8, and 11

In Section 9 of the Office Action, claims 4, 8, and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Farmine in view of Klank *et al.* (U.S. Patent 5,970,397; hereinafter referred to as "Klank").

Based on the foregoing discussion regarding claims 1 and 7, and since claims 4, 8, and 11 depend from one of claims 1 and 7, claims 4, 8, and 11 should be allowable over Farmine. Further, since Klank was merely cited for disclosing a method for the frequency correction of multicarrier signals, Farmine and Klank, individually or in combination, fail to teach or suggest all the limitations of claims 4, 8, and 11.

Accordingly, it is submitted that the rejection of claims 4, 8, and 11 based upon 35 U.S.C. §103(a) has been overcome by the present remarks and withdrawal thereof is respectfully requested.

§103 Rejection of Claim 15

In Section 10 of the Office Action, claim 15 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Farmine in view of Yamamoto *et al.* (U.S. Patent 6,070,056; hereinafter referred to as "Sakoda").

Based on the foregoing discussion regarding claim 7, and since claim 15 depends from claim 7, claim 15 should be allowable over Farmine. Further, since Yamamoto was merely cited for disclosing the reception level of each antenna determines whether transmission of the signal of the respective antenna is to be transmitted throught the ON/OFF switch, Farmine and Yamamoto, individually or in combination, fail to teach or suggest all the limitations of claim 15.

Accordingly, it is submitted that the rejection of claim 15 based upon 35 U.S.C. §103(a) has been overcome by the present remarks and withdrawal thereof is respectfully requested.

Conclusion

In view of the foregoing, entry of this amendment, and the allowance of this application with claims 1-17 are respectfully solicited.

In regard to the claims amended herein and throughout the prosecution of this application, it is submitted that these claims, as originally presented, are patentably distinct over the prior art of record, and that these claims were in full compliance with the requirements of 35 U.S.C. §112. Changes that have been made to these claims were not made for the purpose of patentability within the meaning of 35 U.S.C. §§101, 102, 103 or 112. Rather, these changes were made simply for clarification and to round out the scope of protection to which Applicant is entitled.

In the event that additional cooperation in this case may be helpful to complete its prosecution, the Examiner is cordially invited to contact Applicant's representative at the telephone number written below.

The Commissioner is hereby authorized to charge any insufficient fees or credit any overpayment associated with the above-identified application to Deposit Account 50-0320.

Respectfully submitted,

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Amendments to the Drawings:

The attached sheet of drawing includes changes to Fig. 8. This sheet replaces the original sheet including Figs. 8. In Figure 8, legend '(Prior Art)' has been inserted to replace legend 'State of the Art'.

Attachments: Replacement Sheet

Annotated Sheet Showing Changes

FIG 8

~~State of the Art~~ PRIOR ART